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10/535,311	05/18/2005	Masakazu Funahashi	28955-1050	5735
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STEPTOE & JOHNSON LLP 1330 CONNECTICUT AVENUE, N.W. WASHINGTON, DC 20036			EXAMINER YAMNITZKY, MARIE ROSE	
			ART UNIT	PAPER NUMBER
			1794	
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			05/27/2009	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/535,311

**Applicant(s)**

FUNAHASHI ET AL.

**Examiner**

Marie R. Yamnitzky

**Art Unit**

1794

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 December 2008 and 12 February 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3, 5-8, 10-15, 17, 18 and 20-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-8, 10-15, 17, 18 and 20-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-849)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 02 Dec 2008
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

1. This Office action is in response to applicant's amendment filed February 12, 2009, which amends the specification and claims 1 and 14, and cancels claims 4, 9, 16 and 19. (The text of claim 9 is presented, but the status identifier is "(Canceled)" and the Remarks section states that claim 9 has been canceled.)

Claims 1-3, 5-8, 10-15, 17, 18 and 20-25 are pending.

2. Amended claims 1 and 14 include underlining that indicates added text, as well as underlining that is properly part of the claimed subject matter (in the symbol " $\geq$ "). A clean copy of the claims must be presented in response to this action. If further amendment is to be made to any claim containing the symbol " $\geq$ ", the claim should be canceled and rewritten as a new claim, with appropriate amendment made to the dependency of dependent claims.

Claim 1 has been amended to set forth a numerical limitation for the energy gaps (EG0, EG1 and EG2). The use of underlining makes it difficult to tell whether the symbol preceding each occurrence of "2.6 eV" is ">" or " $\geq$ ". It appears that the added limitation for EG0 > EG2 is " $\geq 2.6\text{eV}$ ". In the case of EG0 > EG1, it is not clear if the added limitation is " $\geq 2.6\text{ eV}$ " or "> 2.6eV". For purposes of this action, claim 1 is interpreted as requiring EG0 > EG1  $\geq 2.6\text{eV}$ , and as requiring EG0 > EG2  $\geq 2.6\text{eV}$ .

3. The objection to the disclosure for informalities, as set forth in the Office action mailed August 12, 2008, is overcome by amendment.

The issue raised with respect to claims 14 and 19 as being substantial duplicates is rendered moot by cancellation of claim 19.

The rejection under 35 U.S.C. 112, 1<sup>st</sup> paragraph, has been reconsidered in light of the amendments to independent claims 1 and 14, and is withdrawn for claim 1 and dependents, but maintained for claim 14 and dependents. There is an inverse correlation between energy gap and wavelength. It is the examiner's understanding that the limitation with respect to EG as set forth in relation (C) of amended claim 1 requires the use of three materials that emit light in the range of wavelengths associated with blue light or shorter wavelengths. Accordingly, claim 1 and dependents have been substantially narrowed with respect to the pool of materials from which the light-emitting-layer material, the first dopant and the second dopant can be selected.

The rejection under 35 U.S.C. 102(b) as anticipated by Hatwar et al. (6,475,648) with evidence from Shi et al. is overcome by claim amendment. With respect to claim 1 and dependents, Hatwar et al. do not disclose or suggest a combination of materials for the light emitting layer that meets relation (C) of claim 1. With respect to claim 14 and dependents, Hatwar et al. do not disclose or suggest a combination of materials that meets relation (B') of claim 14 wherein the first and second dopants are selected from the group in lines 16-18 of claim 14.

The rejection under 35 U.S.C. 102(b) as anticipated by Fukuoka et al. (WO 2001/48116, using US 6,803,120 as a translation thereof) with evidence from Hosokawa et al. and Rost et al., and the related rejection under 35 U.S.C. 103(a) further in view of Sakai et al. (US 6,214,481) is overcome by amendment with respect to claim 1 and dependents, and is withdrawn with respect

to claim 14 and dependents. Fukuoka et al. do not disclose or suggest a combination of materials that meets relation (C) of amended claim 1, and do not appear to disclose or suggest a combination of materials that meets relation (B') of claim 14. The prior examiner provided estimated values for EV1, EC1 and EG1 for one of the dopants disclosed in one of Fukuoka's examples. It is reasonable to expect, based on the peak emission wavelength of this dopant, that the prior examiner's estimate for EG1 is correct. Presuming the prior estimate for EV1 and EC1 is also correct, Fukuoka et al. did not (and does not) meet all the limitations of claim 14 and dependents.

The rejections under 35 U.S.C. 103(a) based on Kobori et al. (US 6,285,039) are withdrawn. The examiner has insufficient information available to be able to make a reasonable determination as to whether any of Kobori's combinations of materials suggest the combination required by the present claims.

The rejection under 35 U.S.C. 103(a) based on Sakai et al. (US 6,224,966) in view of Hosokawa et al. (US 5,536,949) is withdrawn. The examiner does not necessarily agree that the present claims are patentable over this combination of references, but a rejection based on this combination of references would be similar to the rejection based on Sakai et al. (US 2002/0136922 A1) with evidence provided by Hosokawa et al. (US 7,087,322) that is set forth in this action.

4. Claim 21 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the

claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 14, from which claim 21 depends, has been amended to require that each of the first dopant and second dopant be selected from the same materials that are recited in claim 21 for the first dopant “or” the second dopant. (For purposes of comparing to the prior art, claim 21 is interpreted as requiring both the first dopant and the second dopant to be selected from the recited materials since claim 14 requires both to be selected from the recited materials. With this interpretation, claim 21 is a substantial duplicate of claim 14.)

5. Claims 1-3 and 5-13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The application as originally filed does not provide sufficient support for relation (C) as set forth in amended claim 1. Applicant refers to the specification page 38, line 24-p. 39, l. 4; p. 26, l. 21-26; and the original claims for support for the amendment to the claims. Neither the original claims nor the referenced portions of the specification set forth relation (C) as in amended claim 1. Table 1 on page 44 of the specification discloses the energy gap for one of the ten specific compounds as 2.6, but this disclosure with respect to a single compound is insufficient to support relation (C) of amended claim 1.

6. Claims 14, 15, 17, 18 and 20-25 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for combinations of three materials meeting relations (A') and (B') as set forth in claim 14 wherein the three materials are selected from the ten specific compounds disclosed in the specification, does not reasonably provide enablement for the full scope of the invention as claimed in claim 14 and dependents. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

Claim 14 and dependents are drawn to a device in which the light emitting layer comprises at least a light-emitting-layer material, a first dopant and a second dopant, wherein the light-emitting-layer material must have a greater valence electron level than that of either the first or second dopant, must have a conduction level that is greater than or equal to that of the first dopant, and must have a conduction level that is greater than that of the second dopant. Claim 14 further limits the molecular weight of one (any one) of the three materials, and requires the first and second dopants to be selected from a group that generically encompasses numerous compounds. Claim 14 and dependents, with the exception of dependent claims 23 and 24, place no specific limitation on the chemical structure of the light-emitting-layer material, such that this component may be potentially selected from an extremely large number of materials. Even in the case of claims 23 and 24, there are a large number of materials which could possibly be used for the light-emitting-layer material.

The specification discloses ten specific compounds as examples of materials to be combined in the light emitting layer. There are hundreds, if not thousands, of materials from

which the three materials required for the light emitting layer of the claimed device may be selected. While it is true that valence electron level, conduction level and energy gap can be determined for materials using known methods, given the large number of materials from which the three materials potentially can be selected, given the minimal number of examples in the specification, and given a lack of guidance that would enable one to reasonably predict whether a certain combination of materials would meet the claimed relations without having to actually test the materials in question, it is the examiner's position that it would require undue experimentation to make the full scope of the invention as claimed in claim 14 and dependents.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-3, 5-8, 10-15, 17, 18 and 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (US 2002/0136922 A1) with evidence provided by Hosokawa et al. (US 7,087,322 B2).

Sakai et al. provide examples of organic electroluminescent devices comprising a light-emitting layer between a pair of electrodes wherein the light-emitting layer comprises a combination of three materials: Sakai's bisanthracene compound 6-1, which is a phenylanthracene derivative similar to present applicant's compound H1 and meets the

limitations recited in claims 7, 8, 10, 11, 20, 22 and 23, DPVDPAN, which is a condensed aromatic ring compound and is present applicant's compound H2 and meets the limitations recited in claims 5, 7, 17 and 21, and DMPAVB, which is a styrylamine derivative and is present applicant's compound D1 and meets the limitations recited in claims 5, 7, 17 and 21. See Sakai's examples 1 and 2 (pages 8-9). The devices of these examples further comprise a layer between the light emitting layer and the anode which meets the limitations recited in claims 13 and 25.

With respect to the three materials in the light emitting layer of Sakai's examples 1 and 2, the examiner compares compound 6-1 to the presently required light-emitting-layer material, DPVDPAN to the presently required first dopant, and DMPAVB to the presently required second dopant.

Sakai et al. do not explicitly disclose the valence electron level, conduction level or energy gap of the three materials. However, based on Sakai's teachings as well as the data set forth in Table 1 of the present specification, and the data set forth in Table 1 of the patent to Hosokawa et al., it is reasonable to expect that the combination of materials used in Sakai's Examples 1 and 2 inherently meet most of the relations set forth in the present claims as described below. With respect to Hosokawa's data, ionization energy correlates to valence electron level and electron affinity correlates to conduction level. Energy gap is the difference between valence electron level/ionization energy and conduction level/electron affinity. Hosokawa's compound E2 is Sakai's compound 6-1. Hosokawa also provides data for several other compounds that are disclosed in the present specification (for example, Hosokawa's

compound E1 is applicant's compound H2, and Hosokawa's compounds D2 and D4 are applicant's compounds D2 and D3, respectively). Although Hosokawa's values differ slightly from those set forth in the present specification for the same compounds, the values are sufficiently close such that Hosokawa's data concerning compound E2 can be used to reasonably establish that Sakai's combination of compound 6-1, DPVDPAN and DMPAVB meet most of the relations set forth in the present claims.

With respect to energy gap, Sakai et al. teach in paragraph [0028] that it is preferred that the compound of Sakai's general formula (2) have a greater energy gap than the energy gap of the light-emitting material of Sakai's general formula (1), and teach in paragraph [0036] that a fluorescent molecule may be used in combination with the other two compounds and preferably has an energy gap that is smaller than that of the light-emitting material, thus suggesting the relationship of  $EG_0 > EG_1$  and  $EG_0 > EG_2$ . Further, given that Sakai's devices of Examples 1 and 2 emit blue light, it is reasonable to expect that the energy gap of each of the materials in the light emitting layer is greater than or equal to 2.6 eV as required by present claim 1 and dependents. Further, given the data provided in the specification and the data provided in the patent to Hosokawa et al., it is also reasonable to expect that the combination of three materials used in the light emitting layer of Sakai's Examples 1 and 2 inherently meets relation (C) of present claim 1 and dependents. Further, given Sakai's disclosure, it is reasonable to expect that both DPVDPAN and DMPAVB in Sakai's Examples 1 and 2 emit light as per present claims 3 and 15.

Given the data provided in the specification and the data provided in the patent to Hosokawa et al., it is also reasonable to expect that the combination of three materials used in the light emitting layer of Sakai's Examples 1 and 2 inherently meets relation (A) of present claim 1 and dependents, inherently meets relation (A') of present claim 14 and dependents, inherently meets relation (B) of present claim 1 and dependents, and meets the limitations recited in claims 6 and 18.

With respect to present claim 1 and dependents, Sakai's devices of Examples 1 and 2 do not meet the dopant concentration limitation set forth in the last two lines of claim 1, do not meet relation (B') set forth in claim 2 (with claim 3 dependent therefrom), and do not meet the further limitations of claim 12.

With respect to present claim 14 and dependents, Sakai's devices of Examples 1 and 2 do not meet the dopant concentration limitation set forth in the last two lines of claim 14, do not meet relation (B') as set forth in claim 14, and do not meet the further limitations of claim 24.

Regarding the dopant concentration, DMPAVB is used in Sakai's Examples 1 and 2 in an amount of 3% by weight of the layer. However, DPVDPAN is used in an amount of about 69% based on the weight of the layer in Example 1, and in an amount of about 48% based on the weight of the layer in Example 2. However, making similar devices having lesser amounts of DPVDPAN would have been an obvious modification to one of ordinary skill in the art at the time of the invention given, for example, Sakai's teachings in paragraphs [0015] and [0033]. DPVDPAN is a compound of Sakai's light emitting material of general formula (1). The teachings in paragraph [0033] suggest lower amounts of DPVDPAN than used in Examples 1

and 2, and even lower amounts are suggested by Sakai's teaching in paragraph [0015] that more than one material of general formula (1) may be used. The present claims do not limit the composition of the light emitting layer to three materials, and do not limit valence electron level and/or conduction level and/or energy gap for any further materials that the light emitting layer may comprise.

With respect to relation (B') as set forth in present claims 2 and 14, based on the data provided in the Hosokawa patent and the present specification, Sakai's Examples 1 and 2 inherently meet  $EC0 \geq EC2$ , but do not meet  $EC0 \geq EC1$ . Instead, the conduction level of Sakai's compound 6-1 is slightly smaller (by 0.07 eV) than the conduction level of DPVDPAN. (Sakai's compound 6-1 is Hosokawa's compound E2, and Sakai's DPVDPAN is Hosokawa's compound E1. Electron affinity correlates to conduction level.) However, the values are so similar that one of ordinary skill in the art at the time of the invention would have reasonably expected that devices wherein  $EC0$  is only 0.07 eV less than  $EC1$  would function in a similar manner to a device in which  $EC0=EC1$  (as within the scope of present relation (B')), or in which  $EC0$  is only slightly larger than  $EC1$  (as within the scope of present relation (B')). In this regard, the examiner notes that there is insufficient data of record to demonstrate that devices meeting all claim limitations and in which the  $EC0$  is the same as, or only slightly larger than,  $EC1$ , are unexpectedly superior to devices meeting all claim limitations except relation (B'), but in which  $EC0$  is only slightly smaller than  $EC1$ .

With respect to the further limitations of present claims 12 and 24, Sakai's bisanthracene compound 6-1, which is a phenylanthracene derivatives, does not contain an alkenyl group.

However, Sakai et al. do disclose a specific example of a bisanthracene compound that is a phenylanthracene derivative and contains an alkenyl group (Sakai's compound 4-19). Absent a showing of superior/unexpected results, it is the examiner's position that it would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable substituted derivatives to provide a device within Sakai's guidelines.

9. Applicant's arguments filed February 12, 2009 have been taken into consideration when making the rejections set forth in this action. Applicant's arguments relevant to the rejection under 35 U.S.C. 112, 1<sup>st</sup> paragraph, and the prior art rejection set forth in this action, are believed to be addressed, for the most part, in the rejections as set forth in this action.

There are no rejections remaining under 35 U.S.C. 102(b). However, with respect to applicant's arguments regarding the use of multiple references in the prior rejections under 35 U.S.C. 102(b), applicant's attention is respectfully directed to MPEP 2131.01, especially MPEP 2131.01 III.

The examiner also notes that it is not improper to rely on applicant's specification to demonstrate that certain properties are inherent in a specific material and/or that a certain relation between properties of a combination of materials is inherent in a specific combination of materials. Use of applicant's specification in this manner does not constitute using applicant's specification as prior art.

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday and Wednesday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

/Marie R. Yamnitzky/  
Primary Examiner, Art Unit 1794

MRY  
May 26, 2009